

### REMARKS

This application is a continuation of PCT/GB00/01487 filed April 28, 2000. Claims 1-10 were present as originally filed, with claims 9 and 10 canceled and new claims 11-13 added by preliminary amendment. Claims 1-8 and 11-13 were pending in the application. In response to a restriction requirement dated November 13, 2002, Group I (claims 1-7 and 11-13) were elected. Claims 1-8 and 11-13 were, therefore, pending in the application with claim 8 withdrawn from consideration. In response to the Office Action dated April 4, 2003, claims 1-8 and 11-13 were canceled and new claims 14-23 presented. Claims 14-23 are, therefore pending in the application. Reconsideration of the application in view of the above amendment and following remarks is respectfully requested.

### Rejections under 35 U.S.C. §102

Claims 14-23 are rejected under 35 U.S.C. §102(b) as being anticipated by Morris et al. (US 5,234,602.) According to the Office Action, Morris et al. teach "a method of removing scale, such as that containing calcium sulfate from an aqueous solution. The method comprises creating an aqueous medium with a pH in the range of between 10 and 14, adding a chelating agent to chelate the calcium sulfate, acidifying the solution using a mineral acid to lower the pH, wherein the calcium sulfate is precipitated and removed."

The method of the present invention, in response to economic and environmental concerns, is directed to a method of exploiting previously unexploited sources of calcium sulfate, for example, low-grade gypsum and a contaminated source of calcium sulfate that is a byproduct of a flue-gas desulfurization process operated in modern fossil-fuel driven power stations. To emphasize that the current invention encompasses a calcium sulfate purification method, as opposed to a method of removing a calcium sulfate waste product from an aqueous solution, independent claim 14 of the present application is amended above, first, to include the step of "*providing a low-grade source of calcium sulfate to be purified,*" and secondly, that the

recovery of *purified* calcium sulfate is achieved by lowering the pH of the chelate solution to *less than 4.0* with a mineral acid, whereby calcium sulfate is selectively precipitated from said solution. Support for the amendment is found in the specification at page 2, lines 8-12 and at page 8, lines 25-26.

These features of the present invention are not taught by Morris et al. Applicant respectfully submits, therefore, that in view of the above amendment, Morris et al. cannot anticipate the claimed invention.

Anticipation under 35 U.S.C. §102 requires the presence in a single prior art disclosure of each and every element of a claimed invention. Morris et al. teach the use of an aqueous chelation solution as a solvent to remove oil field scale from pipes. To remove the unwanted mineral sulfates from the spent solvent, the pH of the solvent is lowered to a value of about 4-9, preferably 5-7 (col. 3, lines 46-48). Morris et al. seek only to eliminate the mineral sulfates from the chelation solution/solvent so that the solution can be reused. Accordingly, It is Applicant's position that the Morris reference constitutes non-analogous art.

Ultimately, the cited reference fails to teach or fairly suggest a method for purifying any mineral sulfate, let alone calcium sulfate, from a low-grade source of that material. Morris et al. do not teach a method comprising steps a) providing a low-grade source of calcium sulfate to be purified or c) recovering purified calcium sulfate from the low-grade source by lowering the pH of said chelate solution to less than 4.0 with a mineral acid, as required for applicants claimed method. Thus, Morris et al. cannot anticipate Applicant's claimed invention and withdrawal of the rejection is respectfully requested.

Rejections under 35 U.S.C. §103

Claims 20 and 22 are rejected under 35 U.S.C. §103(a) as being obvious over Morris et al. (US 5,234,602.) According to the Office Action, Morris teaches that the chelating agents preferably comprise polyaminopolycarboxylic acids or salts of such acids and while the specific preferred polyaminopolycarboxylic acids are not taught, it would have been obvious to one of ordinary skill to use one of the polyaminopolycarboxylic acids of claim 22. Furthermore, the Office Action contends, while it is not explicitly taught that the chelating agents of Morris et al. are soluble at a pH of less than 4, it is expected that this is the case, because they are acidic compounds and because no difference is seen between the chelating agents of Morris et al. and those of the instantly claimed invention.

Claims 20 and 22 both ultimately depend from independent claim 14, and therefore, include the limitations of claim 14 and all intervening dependent claims. As discussed above, Morris et al. does not teach a method of purifying calcium sulfate or any other mineral sulfate from a low-grade source thereof and additionally does not teach lowering of the pH below a value of 4.0 as recited by Applicant's claim 14, as amended herein. Indeed, as discussed above, the method of Morris has a totally different objective, i.e., the elimination of waste products from a spent solution used to remove scale from pipes. Simply put, Morris et al. teaches the use of a chelation solution with subsequent acidification to remove mineral sulfates from the chelation solution; it says nothing about using the chelation solution with subsequent acidification as a mechanism for purifying a particular mineral sulfate from a low-grade source thereof. Thus, Morris et al. contains no suggestion that the disclosed method would have utility as a method of purifying mineral sulfates, including calcium sulfate, from a low-grade source. Thus, one of skill in the art would not be motivated by nor would they conclude from the teachings of Morris et al. that a purified calcium sulfate preparation could be obtained from a low grade source in accordance with the method of the present invention, i.e., by chelation and subsequent acidification of the chelation solution to a pH below 4.0. Therefore, claims 20 and 22 are neither anticipated nor obvious in view of Morris et al.

Claims 19-21 are also rejected under 35 U.S.C. §103(a) as being unpatentable over Morris et al. in view of FR2510140. The Office Action states that FR2510140 teaches the use of amino-carboxylic acids and quarternary ammonium compounds as chelating agents for calcium sulfate and that it would have been obvious to one of ordinary skill at the time of invention to use the amino-carboxylic acids or quarternary ammonium compounds of FR2510140 in the process of Morris et al. in order to provide a chelating agent for calcium sulfate.


First of all, it is important to recall that FR2510140 teaches a method 1) which relies on the chelation of calcium carbonates rather than calcium sulfates and 2) uses temperature manipulation rather than acidification of the chelation solution for recovery of the carbonates. For the reasons stated above with respect to the teachings of Morris et al., Applicant respectfully submits that in the first instance, one of skill in the art would not be motivated to combine the FR2510140 reference with the teachings of Morris since Morris is not directed to a method of purification of mineral salts of any kind. Furthermore, the combination of the two methods would not result in Applicant's claimed method.

Lastly, claims 19-21 are also rejected under 35 U.S.C. §103(a) as being unpatentable over Morris et al. in view of Lesinski (U.S. 3,308,065). The Office Action states that Lesinski teaches the removal of scale from an aqueous medium with the use of chelating acids such as polyaminopolycarboxylic acids or the ammonium salts thereof and that it would have been obvious to one of skill in the art to use the ammonium salts of the chelating acids, as taught by Lesinski, as the chelating salts of Morris et al. because they are polyaminopolycarboxylic acid salts capable of chelating scale.

In as much as Lesinski, like Morris et al., is directed to a method of removing scale, the reference is inapposite to the claimed method of purifying calcium sulfate from a low-grade source thereof and, therefore, cannot remedy any deficiencies in the method taught by Morris et al., which as discussed above is also irrelevant to the claimed method. Thus, claims 19-21 are not rendered obvious when the teachings of Lesinski are combined with the teachings of Morris et al.

It is respectfully submitted that the above-identified application is now in condition for allowance and favorable reconsideration and prompt allowance of these claims are respectfully requested. The dependent claims are believed allowable for the same reasons as the independent claims from which they ultimately depend, as well as for their additional limitations. Should the Examiner require clarification of any of the above, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

  
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